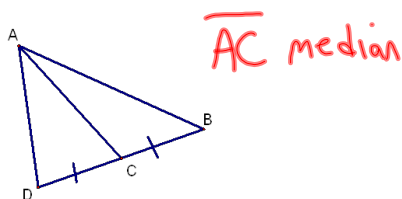
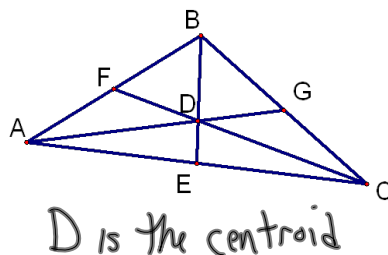


## 5.4 Use Medians and Altitudes

**Median**—is a segment whose endpoints are the vertex of a triangle and the midpoint of the side opposite the vertex.

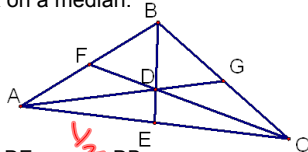


**Centroid**—The point of concurrency of the three medians of a triangle.



Thm 5.8 The Centroid Theorem—The centroid of a triangle is located two-thirds of the distance from a vertex to the midpoint of the side opposite the vertex on a median.

Conclusion:



$$DB = \frac{2}{3} BE \quad DE = \frac{1}{3} BE \quad DE = \frac{1}{2} DB$$

$$DA = \frac{2}{3} AG \quad DG = \frac{1}{3} AG \quad DG = \frac{1}{2} AD$$

$$CD = \frac{2}{3} CF \quad FD = \frac{1}{3} CF \quad FD = \frac{1}{2} CD$$

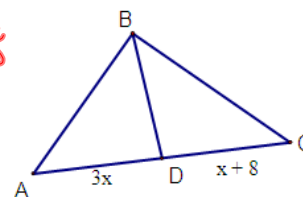
Examples:

1.  $\overline{BD}$  is a median in  $\triangle ABC$ . Solve for  $x$ .

$$3x = x + 8$$

$$2x = 8$$

$$x = 4$$



2. G is the centroid.

$$AG = 7.4$$

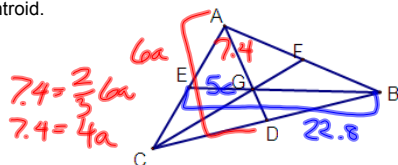
$$AD = 6a$$

$$a = 1.85$$

$$GE = 5c$$

$$EB = 22.8$$

$$c = 1.52$$

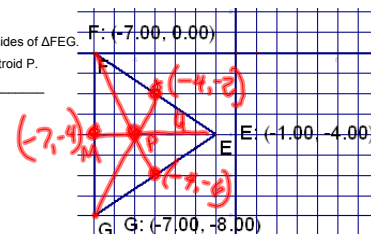


3. Find the midpoints of the three sides of  $\triangle FEG$ .

Sketch the medians. Label the centroid P.

What are the coordinates for P? \_\_\_\_\_

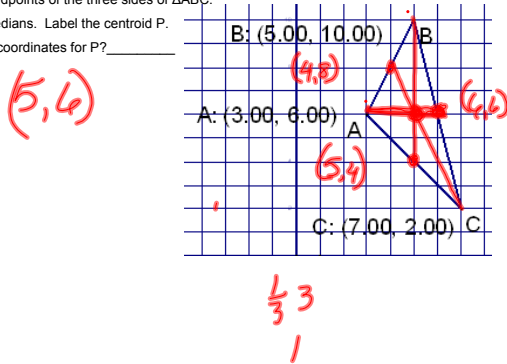
$$(-5, -4)$$



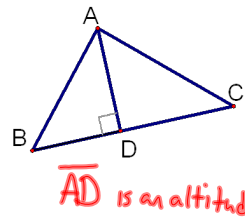
$$ME = 6$$

$$\frac{2}{3} \cdot 6 = 4$$

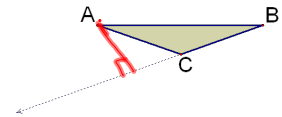
4. Find the midpoints of the three sides of  $\triangle ABC$ .  
Sketch the medians. Label the centroid P.  
What are the coordinates for P? \_\_\_\_\_



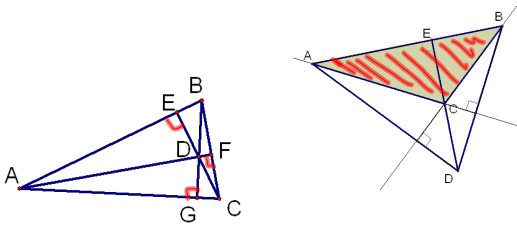
**Altitude**—of a triangle is a perpendicular segment from a vertex to the line containing the opposite side.



The altitude from A to  $\overline{BC}$  is on the outside of this triangle.



**Orthocenter**—is the point of concurrency of the three altitudes of a triangle.



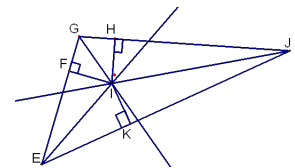
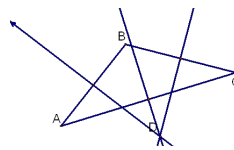
**Summary**

The circumcenter. (3  $\perp$  Bis.)

$$\overline{DA} \cong \overline{DB} \cong \overline{DC}$$

The incenter. (3  $\angle$  Bis.)

$$\overline{FI} \cong \overline{HI} \cong \overline{KI}$$

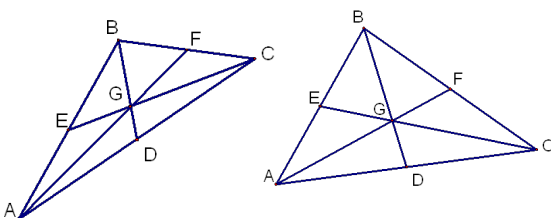


**The Centroid**

$$BG = \frac{2}{3} BD$$

$$GD = \frac{1}{3} BD$$

$$GD = \frac{1}{2} BG$$



Challenge: Find the coordinates of the centroid of triangle ABC  
A(5, 4) B(1, -2) C(-4, 0)

Find 2 equations of medians.

Find the intersection.

$$(-4, 0) (3, 1)$$

$$m = \frac{1-0}{3-(-4)} = \frac{1}{7}$$

$$y = \frac{1}{7}x + \frac{4}{7}$$

$$\frac{1}{7} = b$$

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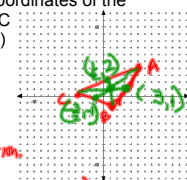
$$y = \frac{1}{7}x + \frac{4}{7}$$

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$$y = \frac{1}{7}x + \frac{4}{7}$$



$$(-4, 0) (3, 1)$$

$$m = \frac{1-0}{3-(-4)} = \frac{1}{7}$$

$$\frac{1}{7} = b$$

$$y = \frac{1}{7}x + \frac{4}{7}$$

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HW  
p322-323  
#s 17-22, 25-27, 33, 35